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A NEW AFRICAN SPECIES OF *RHAMPHOMYIA* WITH ABBREVIATED DISCAL VEINS, CLOSELY RESEMBLING TWO NEW AFRICAN SPECIES OF *EMPIS* SUBG. *COPTOPHLEBIA* (DIPTERA EMPIDIDAE)

By J. E. Collin, F.R.E.S.

The genus *Empis* sens. lat. has always been distinguished from *Rhamphomyia* sens. lat. by the one character of the fork to the cubital vein, and there is a section of the genus *Empis*, in which the species have an abbreviated discal vein, which has been given the name of *Coptophlebia*. Several cases of apparent parallel development in the two large genera *Empis* and *Rhamphomyia* are well known, and the discovery of a new species of *Rhamphomyia* with abbreviated discal veins now recorded adds to the number, but this new species and two others apparently referable to the subgenus *Coptophlebia*, described below, resemble each other in so many characters, except the cubital fork (and a few other characters certainly only specific) that one wonders whether the value of this fork as a primary division has not been over-rated. All three species are rather small (3–3·5 mm.), mainly grey in colour, with clear wings and very pale yellow veins, and mainly yellow legs. Eyes touching on frons in male, but upper eye facets very little larger than lower ones. Face longer than wide. Ocellar bristles very small. Occiput with very few bristles, only a postocular row near eyes on less than upper half, and a second row behind this overlapping it for a short distance, and therefore further from eye-margin, but approaching quite close to eyes below. Labellae of proboscis very long and slender with numerous pseudo-annulations caused by transverse whitish lines. Thorax with comparatively few acrostichal and dorsocentral bristles both irregularly uni- to bi-serial, the former ending at beginning of prescutellar depression, latter uniserial and longer each side of that depression. Prothoracic sternum with 2–4 small bristles above each front coxa, but episterna bare; collar with a row of 6–10 bristles above. Scutellum with only two bristles. A few microscopic hairs *beneath* edge of postalar callus. Male hypopygium small, upper lamellae dorso-ventrally flattened, side lamellae normally concealed except for its upper margin, the projecting sides of eighth tergite liable to be mistaken for side lamellae, eighth sternite large, penis slender, normally concealed except at tip where it lies within a sheath which is probably an abnormal development of the ventral lamella. Legs with no bristle in " comb " behind tip of hind tibiae. Wings with subcostal vein ending about opposite end of discal cell, fork to cubital vein when present almost at 90° to vein and straight, and the two upper veins from discal cell not reaching wing-margin.

The distinguishing features of the three species are as follows :—

Rhamphomyia rhodesiensis sp. n. ♂ ♀.

A grey species with mainly yellow legs (partly pennate in female), and with two upper veins from discal cell not reaching wing-margin.

♂. Occiput, frontal triangle and face dull grey, lower margin of face and clypeus shining black. Antennae black, first segment longer than second, which is brownish towards tip, third rather more than twice as long as deep at base, style almost as long as this depth, dark hairs at end of first two segments inconspicuous. Palpi slender, dark on basal half, end part slightly dilated and yellow, a few dark hairs on lower side only. Labrum tawny brown, quite half as long again as head is deep. Thorax uniformly dull grey except for a rounded polished black spot above root of each wing immediately in front of root of supra-alar bristles, and some faint indication of darker stripes down disc on lines of bristles. Humeral and posthumeral bristles fairly well developed, stronger bristles being two posterior notopleurals, a supra-alar, postalar, the posterior dorsocentral, two scutellar and the numerous black metapleural bristles. Intrahumeral bristle very weak.

Abdomen yellowish with slight silvery reflections, side margins of tergites dark brown, and a tawny brown band spreads across base of each segment from second onwards becoming successively broader until seventh tergite is almost entirely brown, the yellow hind margins becoming thus successively narrower. Venter mainly yellowish but becoming greyish-brown towards end and on hypopygium. Pubescence dark, longest at sides, especially on second tergite, very short and scattered on disc and on venter, with some longer bristles towards hind margin of eighth sternite.

Legs yellow, narrowly darkened at tip of each tibia and of each tarsal segment, and some indication of slight darkening towards end of hind femora. No conspicuously strong bristles on femora, or four anterior tibiae; hind tibiae longer and stouter than others with a double row of strong bristles above. Basal segment of all tarsi with some short spines beneath and round tip, that of hind tarsi much stouter and with a pair of bristles on upper side at about middle, and another pair at tip, a pair of similar but shorter bristles at end of second, and still shorter ones at end of third segment. No distinct bristle at base of costa. Squamae and halteres yellow, knobs of latter paler.

♀. Eyes separated by a shining black frons quite as wide as face. Eye facets all equal in size. Thorax similar to that of male. (Abdomen missing in type.) Legs also similar but with more conspicuously darkened end third of hind femora, and some dark pennate fringes, the most noticeable being a spaced row of about 20 broad flat scales (each longer than broad and not quite so long as femur is deep) beneath hind femora, but not extending to extreme base; a few much narrower scales above hind femora just beyond middle; a row of narrow scales beneath hind tibiae from near base to just beyond middle; a similarly placed posteroventral row of still narrower scales on middle femora; and 3–4 very narrow scales beneath front femora just beyond middle. Chaetotaxy of legs otherwise very much as in male; basal segment of hind tarsi not so stout.

Length about 3·5 mm.

Described from three males (one the type) and one damaged female from Salisbury, Southern Rhodesia, taken by Mr. A. Cuthbertson on flowers of *Mentha sylvatica* on 14.xii.1936, and sent by him to the Imperial Institute of Entomology. Type now in the British Museum.

The next two species can be referred only to *Coptophlebia*, but whereas in typical species of that subgenus only the first (upper) vein from discal cell is abbreviated, in the two species described below this is the case with the first two veins, and they otherwise differ in many more characters from typical *Coptophlebia* than they do from *Rhamphomyia rhodesiensis*.

Empis (Coptophlebia) valga sp. n. ♂.

A grey species having yellowish abdomen with silvery reflections, and mainly yellow legs, with peculiar hind knees.

♂. In general appearance remarkably like *Rhamphomyia rhodesiensis*, but differing as follows :—First two antennal segments yellow, style quite half length of third segment. Thorax with no polished supra-alar patch; prothorax, humeri, and postalar calli somewhat yellowish. Thoracic bristles longer, intra-humeral and posthumeral bristles stronger, an additional strong (anterior) notopleural bristle. Abdomen decidedly silvery in some lights, sides of tergites not quite so dark and pubescence rather shorter there except on second and third segments. Legs yellow, with similar dark tips to tibiae and each tarsal segment, but more strongly bristled and all legs stouter; middle tibiae with strong bristles above similar to those on hind pair; front tibiae more weakly bristled except towards and round tip; all tarsi more bristly, especially basal segment of front tarsi, which has three pairs of strong bristles above, and (like that of middle tarsi) more distinct spines beneath. Hind femora just before tip with a strong posteroventral swelling which bears a dense brush of curved shining black bristles. Hind tibiae when viewed from above with an angular bend (in posterior direction) just beyond where femoral brush passes when femora and tibiae are bent towards one another, and distinctly swollen at the angle. A small but distinct black bristle at base of costa.

Length about 3·25 mm.

A single male in the British Museum from Obuasi, Ashanti, West Africa, caught by Dr. W. M. Graham on 4.viii.1907 " on leaf in bush path."

Empis (Coptophlebia) appendiculata sp. n. ♂.

Very much like *C. valga*, but thorax slightly browner, abdomen all dull tawny brown with scarcely any silvery reflections, and hind knees simple.

♂. Colour of antennae and chaetotaxy of thorax as in *C. valga*. Thorax not so grey. Abdomen uniformly dull brown except for very narrow yellow hind margins to tergites. Pubescence more uniform, especially not so long at sides of second and third tergites. Hypopygium apparently very similar, but eighth sternite with a small prominent tubercle at middle near base.

Legs of similar coloration and tibiae and tarsi similarly strongly bristled. Hind femora and tibiae simple, but femora with distinctive bristles as follows :—3–4 very long bristles in front just beyond middle, preceded by a row of 4–5 bristles, which become shorter towards base of femur; posteroventrally with a row of bristles, of which the first 2–3 near base are long and fine, those just beyond middle shorter and a little stronger, at which point (opposite the long bristles in front) the row ends abruptly. Hind tibiae with a posteroventral fringe of bristly hairs, longest about base. Wings and halteres as in *C. valga*.

Length about 3 mm.

Two males in the British Museum also from Obuasi, Ashanti, and captured by Dr. W. M. Graham, one " on book, in verandah " on 1.v.1906, the other " in bush 5 p.m." on 3.x.1907.

The *Coptophlebia chrysocera* from Tanganyika Territory described by me (1930, *Proc. R. ent. Soc. Lond.* (B) **4** : 100), though very different in general appearance and structure of male prehypopygial segments, has labellae of proboscis similar to all three species described above, and similar wing venation.

A NEW SPECIES OF *PIPUNCULUS* (DIPTERA) FROM SICILY

By J. E. Collin, F.R.E.S.

Pipunculus zernyi sp. n. ♀.

A species of the *sylvaticus*-group easily distinguished by the conspicuous dense pale pubescence on thorax and disc of scutellum.

♀. Frons wide, as wide at ocellar triangle as above antennae and wider at middle. Face rather narrower than front of frons. Occiput prominent, dusted greyish except on upper front part (behind ocellar triangle), where it is polished black like upper part of frons; this shining part of occiput is continued sideways for a short distance behind each eye-margin and down each side of frons to nearly half-way to antennae leaving the concave middle line of frons dusted greyish like the front half, the dusted middle line ends a short distance in front of front ocellus. Antennae with rather long pointed third joint covered with silvery pile.

Thorax dusted greyish except perhaps across middle towards behind. Humeri pale yellow. Long dense pale pubescence is present on humeri, on disc of thorax (except for a middle line and a patch between dorso-central and supra-alar lines of hairs), and on scutellum.

Abdomen shining black with dusted side patches to tergites, and universally and densely clothed with pale pubescence, shorter than that on thorax. Hypopygium shining black with a straight yellowish aculeus longer than the globular basal part, its point reaching end of third segment.

Legs black, dusted greyish, with extreme tip of femora and tibiae, and base of tibiae, yellowish; tarsi tawny yellow with darker last joint. Femora all rather stout and clothed with pale hairs; four anterior femora and hind trochanters with 1–2 very small yellowish bristles beneath at base. Ungues and pulvilli long.

Wings clear and with usual venation of this group. Halteres yellow.

Length about 3·5 mm.

Described from a female in the Vienna Museum taken by Dr. Zerny in Sicily (Isola d. Femine) on 17th May, 1921.

ON THE PRESENT STATUS OF *VINDULA* (*CYNTHIA* AUCT.) *EROTA* (FAB.) AND *V. ARSINOË* (CR.) (LEP. RHOP., NYMPHAL.)

By W. Roepke, Ph.D.
(*Wageningen, Holland.*)

Communicated by Dr. A. S. Corbet, F.R.E.S.

The late Mr. Fruhstorfer in 1912 (Seitz, **9** : 475 *et seq.*), as well as in severa previous publications, distinguished between the western *V. erota*-forms and the eastern *V. arsinoë*, chiefly on account of the male genitalia. These appendages (figs. 1, 2), already described and figured by van Eecke (1914, *Notes Leyden Mus.*, **36** : 230, fig. 4), are fairly simply built, the dorsal portion, tegumen + uncus (teg, unc), showing no peculiarities, beyond a conspicuous scaphium (sca) which supports the large anal papilla (an. p). The claspers (valvae, va) are simple in shape and, as in many other Nymphalids, they bear a dorso-basal process which is forceps-like (fo), consisting of a pars superior (p.s.) and a pars inferior (p.i.). The p.s. is strongly sclerotised, the p.i. is weaker, its inner side becoming membranous and not always clearly visible in balsam mounts. The real base of the va shows a conical, hairy structure, which I call penicillium (pe). The aedeagus (aed) is slightly bent at its distal orifice, and dorsally, some paired cuticular structures, like small teeth, etc., are visible.

Fruhstorfer (*loc. cit.*) states quite correctly that in the western "*erota*"-forms, the p.s. is strongly bent downwards, whereas in the eastern "*arsinoë*" it is distinctly straight. He includes under "*erota*" all the races of *Vindula* from India, Malaya, Sumatra, Java, Borneo, Celebes and the Philippines, those of "*arsinoë*" being confined to the Moluccas (Amboina), etc. This separation, however, is not entirely in accordance with the facts. When dissecting a large number of male *Vindula* from very different western and eastern localities, the situation appeared as follows :

(1) All the *Vindula* ♂♂ from Ceylon, India, the Himalayas and Siam which I investigated show the p.s. distinctly bent downwards, so they may be considered as *V. erota* forms or closely allied species.

(2) In Malaya, Sumatra, Java and Borneo, both the species *V. erota* (p.s. curved downwards) and *V. arsinoë* (p.s. straight) occur.

(3) From Celebes, the Moluccas and the Philippines I found only *V. arsinoë* (p.s. straight).

From these results, it becomes clear that Malaysia is inhabited by both species. In Java and Sumatra, the ♂♂ may be distinguished at once, the ♂♂ of *V. erota* being very short-tailed or even tailless, whereas the *V. arsinoë*-♂♂ are distinctly tailed. I have examined about 100 males from these two islands; unfortunately the females are very scarce, and my material is so limited that they cannot be considered here. Furthermore, it may be stated that *V. erota* in Sumatra, Java and Borneo prefer the higher elevations (viz. above 1000 m.), whereas the *V. arsinoë*-forms are limited to the lowlands, being met with even at the shore. But this rule is not without exceptions; I have some Javan and

Sumatran *V. erota*-♂♂, caught in the lowlands and even near the coast; on the other hand, I have seen (or possess) *V. arsinoë*-♂♂ from higher elevations, occasionally even more than 1000 m.

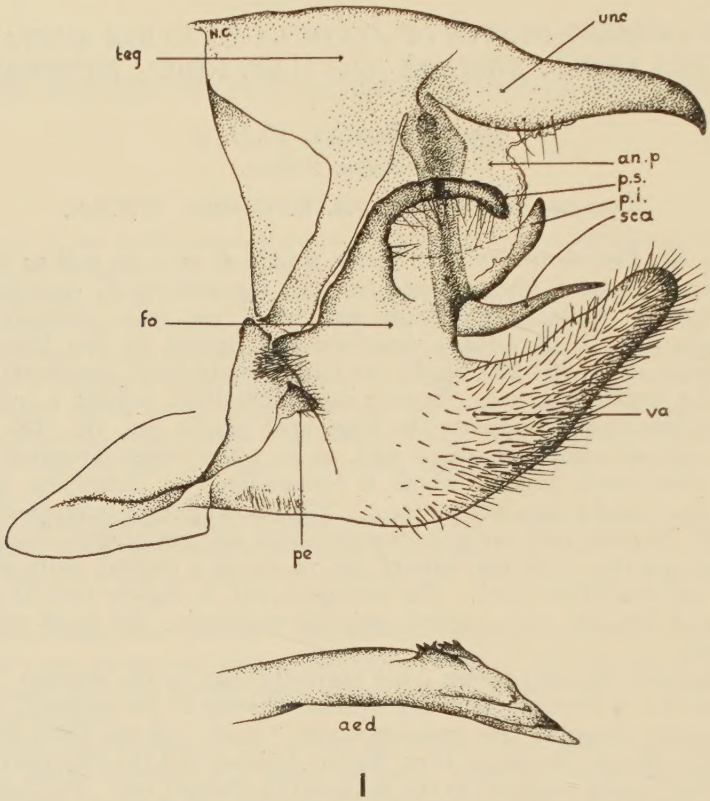

FIG. 1.—♂-Genitalia of *Vindula erota gedeana* Fruh. from Java (mountains).

The more important *Vindula* races from southern Asia are therefore as follows:

V. erota asela Moore : Ceylon.
V. e. saloma Swinh. : S. India.
V. e. erota F. : Siam, Burma, Sikkim.
V. e. battaka Mart. : Sumatra.
V. e. montana Fruh. : Borneo.
V. e. gedeana Fruh. : Java.*

V. arsinoë erotella But. : Malaya.
V. a. erotoïdes Nic. : Sumatra.
V. a. javana Fruh. : Java.
V. a. dajakorum Fruh. : Borneo.
V. a. celebensis But. : Celebes.
V. a. arsinoë Cr. : Amboina.
V. a. deione Erichs. : Luzon (Philippines).

I have dissected males of all the above-mentioned insects, with the exception of *V. erota montana* Fruh., of which, however, I have seen a large series. Furthermore, I have prepared slides of several eastern "species" from the

* There is also an undescribed subspecies from Malaya.

Molucca and the Papuan region, and find that they all belong to the eastern *V. arsinoë* type.

Finally, it may be mentioned that the different " races " or " subspecies," both of *V. erota* and of *V. arsinoë*, show some differences as to the armature of the aedeagus, the shape of the penicillium, the length of the uncus and the

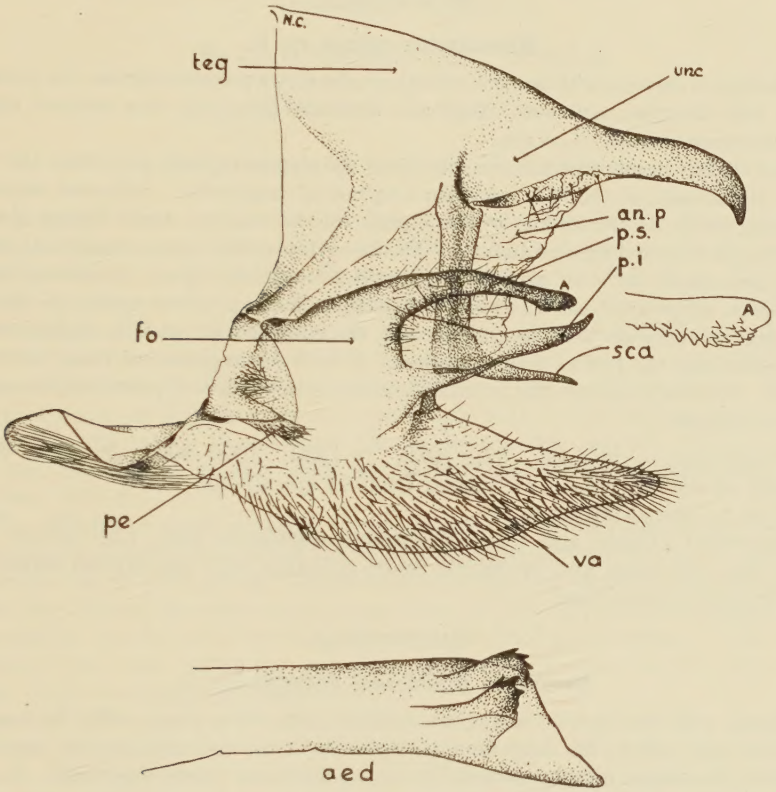

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FIG. 2.—Genitalia of *V. arsinoë javana* Fruh. from Java (lowlands).

teg = tegumen; unc = uncus; an. p. = anal papilla; fo = forceps; p.s. = processus superior; A the same enlarged; p.i. = processus inferior; sca = scaphium; va = valva; pe = penicillium; aed = aedeagus.

breadth and the length of the valva. Further investigations on a larger scale may throw more light on the question as to which " forms " may be treated as " subspecies " only and which may be considered as distinct species.

I wish to acknowledge the considerable assistance given me by the authorities of the British Museum (Natural History), the Tring Museum, the Vienna Museum, the Buitenzorg Museum, the Leiden Museum, by Dr. A. Steven Corbet and several correspondents in the Far East.

TWO NEW INJURIOUS PHYTOPHAGA FROM NYASALAND (COLEOPT.)

By G. E. Bryant, F.R.E.S.

(*Entomologist, Imperial Institute of Entomology.*)

Eumolpinae.

Rhembastus coffeae sp. n.

Subelongate fulvous, with aeneous reflections, the elytra punctate-striate, the prothorax bronze with irregular punctures. Legs and antennae testaceous, the terminal segment of the antennae fuscous. L. 4 mm.

Head slightly bronze with aeneous reflections, the clypeus rugosely punctured, the vertex almost impunctate, at the base a median longitudinal impression. Antennae testaceous, extending nearly to the middle of the elytra, the 1st segment more dilated than the following, the terminal segment fuscous. Prothorax transverse, bronze, irregularly and not closely punctured, its sides slightly contracted towards the front. Scutellum bronze, impunctate. Elytra fulvous with aeneous reflections, finely punctate-striate, the shoulders and interstices between the striae impunctate, the interstices at the sides slightly costate. Legs testaceous, the femora feebly toothed. ♂ with 1st segment of front tarsi more dilated. Underside fulvous, the ventral segments of the abdomen paler and less metallic than the sternum.

Nyasaland: Misuku, 21.x.1929, iv.1930, 4000–5000 ft. (*C. Smee*). Feeding on coffee stems. Described from 11 specimens.

Type in British Museum.

Somewhat closely allied to *Rhembastus natalensis* Lef., but differs in its larger size, the head and prothorax more metallic, and the elytral striae with the punctures much finer.

Galerucinae.

Monolepta (Candezea) gossypii sp. n.

Oblong, with the apex of the elytra rounded, pale olive green, with the head and prothorax pale yellow, the eight terminal segments of the antennae and the tarsi black. Prothorax transverse, feebly punctured, the elytra finely and closely punctured. L. 5 mm.

Head pale yellow, the clypeus impunctate, the base of the head finely punctured, a transverse impression behind the insertion of the antennae. Eyes large and prominent. Antennae with the three basal segments yellow, the eight terminal segments black, the basal segment the longest, about equal to the second and third together. Prothorax pale yellow, transverse, very feebly punctured, the sides nearly straight, tapering slightly towards the front, the anterior angles oblique. Scutellum pale yellow, triangular, and impunctate. Elytra pale olive green, oblong and rounded at the apex, closely and finely punctured, with traces of two fine striae on each. Legs with the femora pale olive green, the tibiae pale yellow and pubescent, the tarsi black, the first segment of the hind tarsi very long. Underside pale yellow, clothed with very fine pubescence, the ventral segments of the abdomen about equal to each other.

Nyasaland: Nkwale, 9.xii.1936 (*C. Smee*). On Ratoon Cotton. Described from 9 specimens.

Type in the British Museum.

Allied to *M. goldingi* Bry., but differs in its larger size, the colour slightly greener, and the antennae and tarsi black.

ORTHOPTERA COLLECTED IN THE ATLAS MOUNTAINS, MOROCCO, 1934–1936. PART 1

By K. H. Chapman, B.A., F.R.E.S.

With One Text-figure.

(With two notes by Dr. B. P. Uvarov.)

This paper is based on three collections (now all in the British Museum) made in French Morocco in 1934, 1935, and 1936. While in Morocco in the summer of 1934 with the Cambridge University Freshwater Biological Expedition (which was supported by the Percy Sladen Trust) I was encamped by the side of Lake Sidi Ali ou Mohammed, in the Middle Atlas Mountains, and I was able to make a small collection of Orthoptera. Later camps were at Ouiouane and by the Oum er R'bia falls in the Middle Atlas, and among the foothills of Ari Ayachi, or Ayashin, as it is variously called, the highest range of the eastern Great Atlas. I ascended the highest point, Djebel Ayachi (13,500 ft.), but found few insects, and no Orthoptera, above the tree-line, which is about 7000 ft.

The collection made in 1934, although small, was very interesting; besides furnishing new information on the distribution of several species, it contained a new species of Tettigoniid, *Uromenus chapmani* Uv. (described in this paper), which was almost the commonest large insect at Sidi Ali ou Mohammed, not an inaccessible locality and one visited previously by lepidopterists. This led me to think that more intensive collecting, and visits to less known parts of the Atlas, might be highly profitable.

In the following year I visited Morocco again, to collect for the British Museum, especially to survey the Orthopterous fauna, and to carry out observations on the life-history and occurrence of the Moroccan locust, *Dociostaurus maroccanus* (Thunb.). Owing to a misunderstanding, I was not able to leave until late in August, too late for the third object, and a little too late for many Orthoptera. Funds also did not permit of extensive travelling or of reaching the Great Atlas in the south. At the same time, many interesting points came to light, and among the collections were long series of a new and most interesting short-winged Acridiid, *Omocestus maroccanus* Chapman, described by me in another paper (1937, *Ent. mon. Mag.*, **73**: 127–129), and, from the same locality, a short-winged *Calliptamus* subsequently described by Chopard (1936, *Bull. Soc. Sci. nat. Maroc*, **16**: 177–178) as *C. montanus* (see below).

In June 1936, with Mr. G. A. Bisset, I visited the western Great Atlas, to collect for the British Museum. Collections were made in the Great Atlas south of Marrakesh, at Ijoukak, Mouldirt, and Tizi N'Test, visits were made to Ourika and Amizmiz from Marrakesh itself, considerable collecting near Marrakesh was done, one day's visit to Taroudant, south of the Great Atlas, was made, and finally a few days' collecting was undertaken in the Middle Atlas, at Sidi Ali, Azrou, and Ras el Ma, to compare the June fauna with that of July–August, as observed in 1934, and August–September 1935.

As collections were made in 1934 in July and August, in 1935 in late August and September, and in 1936 in June, some information on seasonal occurrence might be expected, and many differences in the Orthopterous fauna were actually evident. Thus, of the species mentioned above, *Uromenus chapmani* Uv., literally hundreds of thousands of individuals were to be seen at Sidi Ali in July, whereas in September 1935 only two females of this species were found in the same locality, and in June 1936 only a single immature female was taken.

No previous records exist for Orthoptera from the eastern Great Atlas, and a large proportion of species are here recorded for other regions, especially south-west Morocco (Taroudant), for the first time. Of the 79 species noted in this paper, over half were previously unrepresented from Morocco in the British Museum collection, and of those already in the Museum collection, most were represented only by an odd specimen or two, the majority having been collected by M. Rungs of the Institut Scientifique Chérifien at Rabat. About a dozen species were completely new to the Museum collection, and nine species are recorded for Morocco for the first time. The present paper includes one new species, and a description of a Moroccan subspecies of *Sphingonotus coerulans* (L.)—the first record of this species south of the Mediterranean. In addition, a number of new species seem to be represented by a few specimens. These I have decided not to describe until more material has been collected.

Bolivar (1914, *Mem. R. Soc. Esp. Hist. nat.* **8** : 165–238) recorded 206 species of Orthoptera for Morocco; Chopard (1927, *C.R. Ass. franç. Av. Sci.* **51** : 274–277) gave 230; Uvarov (1927, *Bull. Soc. Sci. nat. Maroc*, **7** : 199–215) added 11 species; Werner (1929, *SitzBer. Akad. Wiss. Wien*, (1) **138** : 167–188) added 4; Uvarov (1930, *loc. cit.* **10** : 210–214) 3; Uvarov (1935, *loc. cit.* **15** : 1–4) 2; Chopard (1936, *Bull Soc. Sci. nat. Maroc*, **16** : 151–179) 19; Chapman (1937, *Ent. mon. Mag.* **73** : 127–129) 1; Chapman (1937, *loc. cit.* : 157–159) 1; the present paper thus brings the number of species known to inhabit Morocco to 272.

As is to be expected, most of the species of Orthoptera taken in Morocco have predominantly Palaearctic affinities, with some African elements such as *Oxyothespis*, and other forms of Afro-Asiatic distribution such as *Polyphaga*, while a few genera such as *Phaneroptera* extend over the greater part of Europe, Asia, and Africa. At the same time, the affinities of certain species with near-eastern groups are notable, e.g. *Omocestus maroccanus* Chapman from the Middle Atlas, and *O. nanus* Uv. from Asia Minor.

Chopard (1927, *loc. cit.*) states that the " Mediterranean " fauna of Algeria extends throughout the littoral region, and spreads south to various points, depending on local climatic conditions—almost to desert at, for example, Biskra, Bni-Ounif, and Ain-Sefra. The mountain region does not differ vastly from the littoral fauna, according to Chopard, but some groups, particularly the Sciobiae Ephippigerinae, and Pamphaginae, show interesting features, such as the replacement of one species of Pamphagian by another according to altitude in the Djurdjura (Werner, 1914, *SitzBer. Akad. Wiss. Wien*, **123** : 368). Unfortunately, the Pamphaginae are in too confused a state for any conclusions to be drawn from their distribution, as even correct identification is impossible at present. But further collecting of Ephippigerinae may well reveal a similar state of affairs to that described by Werner for the Pamphaginae. Many restricted, but locally abundant forms, such as *Uromenus chapmani* Uv., may be found in the numerous upland meadows of the Middle Atlas when these are more fully collected.

Chopard (*loc. cit.*) remarks that the mountain fauna of north Africa passes

into that of the desert, but that owing to the mountain barrier, the enrichment of the desert fauna from the north has been slight; the desert fauna has few connections with that of the Mediterranean coast, and more with that of Arabia and Transcaucasia, many elements having been derived from eastern Mediterranean and central Asian sources, such genera as *Eremiaphila*, *Platypterna*, etc., being characteristic of both steppe and desert. Thus the record below of *Eremiaphila denticollis* Luc., from *north* of the Great Atlas Mountains, is of considerable interest. On the whole, the fauna of the eastern Great Atlas, when adequately explored, might be expected to contain other forms with desert relationships as opposed to the more purely " Mediterranean " fauna of the western Great and Middle Atlas.

In concluding, Chopard remarks that the fauna of North Africa in general is more rich in the west than in the east, in particular the desert fauna and those groups which have many representatives in north Africa—out of the 230 species he records for Morocco, he states that only 110 are found in Algeria. This conclusion would be borne out by my results, but as I was able to do far more collecting in the west in 1936, when my time could be wholly devoted to entomology, than in the east in 1934, when entomology had necessarily to be only a side-line, this evidence is not decisive. Chopard says : " La faune étant plus riche dans l'Ouest, comme si les migrations avaient amené une concentration des espèces dans cette region." But besides the comparative abundance of species in the west of Morocco as compared with the east, one may in some cases observe an apparently greater range of variation in the highlands than occurs in the adjoining (eastern) plains in north-west Africa. Thus, one may compare the variation in colour of *Thalpomena algeriana* (Luc.), referred to below, in Morocco and western Algeria, with its constancy in one form in the eastern semi-desert and littoral of Algeria. This kind of variation could hardly be explained by " concentration " of westerly migration. Possibly, in a highland region such as exists in Morocco, species tend to become separated into local groups more easily than in a flat " continuous " country, and small variations thus preserved and inbred (cf. Thomas, 1936, " Cosmic Rays and the Origin of Species," *Nature*, **137** : 51 *et seq.*). But unfortunately, in connection with the particular case cited (*Thalpomena algeriana* (Luc.)), so little is known about the nature of coloration in the wings of Acrididae, and its variation, that one could draw no conclusions of much value without considerably more data.

Of the mountain-dwelling forms noted in this paper, nearly one-third are brachypterous or wingless in one or both sexes. The newly-described brachypterous species *Calliptamus montanus* Chop., *Uromenus chapmani* Uv., and *Omocestus maroccanus* Chapman all appear to exist only at altitudes of 6000 ft. or more.

In order to avoid unnecessary repetition, the details and heights of the localities collected are not repeated but are given in full below : " Sidi Ali " refers to Aguelman (= Lake) Sidi Ali ou Mohammed, Middle Atlas Mountains, 6500 ft. There are a number of small, highly-perched lakes in the Middle Atlas referred to by the term " Aguelman." They are found in volcanic or karstic localities, and often occupy craters or poljes. Sidi Ali is such a lake, in limestone and volcanic country. The vegetation is nearly " semi-desert " and contains such characteristic genera as *Anthyllis* and *Helianthemum*. The lake borders on degenerating cedar forest. Timhadit, 5000 ft., is a small village in the Middle Atlas, about 14 miles from Sidi Ali. Specimens were collected on flat land bordering the river Guigou, and in the volcanic gorges through

which the river flows. Azrou, 4400 ft., is a small town in the Middle Atlas, surrounded mainly by thick cedar forest. Specimens were collected here on pasture land at the edge of the forest, the Sciobiae, of course, being found under stones. Ouiouane, 3000–4000 ft., is a clearing within thick cedar forest in the Middle Atlas. Oum er R'bia, 3000–4000 ft., is a glade in evergreen oak forest in the Middle Atlas, with large falls.

The Orthoptera from " Ari Ayachi " were mainly taken in gullies or small valleys with a mixture of cedar and evergreen oak, running through the foothills of this range of the eastern Great Atlas. A few were also taken in the " meseta " or semi-desert country between the Middle and eastern Great Atlas.

Ourika, 2925 ft., and Amizmiz, 3250 ft., are villages in the western Great Atlas foothills not far from Marrakesh. The country is fairly well covered, at least in parts, by oak and " argan " trees. Similar, but thicker, forest is found at Ijoukak, 3900 ft., and Mouldirt, 5360 ft., in the Great Atlas south of Marrakesh, but in these two localities most of the Orthoptera were collected in rocky and barren spots. Farther south is Tizi N'Test, 7150 ft., a windswept pass on the face of the Great Atlas, looking down to the valley of the Sous river in the south, in which valley lies Taroudant, 820 ft., in the southwest, south of the Great Atlas.

French spellings of Arabic and Berber names of localities have been used, as they are the ones used on most maps, and so confusion may be avoided.

The papers referred to are as follows :

" Bolivar 1914 " : I. Bolivar, 1914, Dermápteros y Ortópteros de Marruecos, *Mem. R. Soc. Esp. Hist. nat.* **8** : 165–238.

" Uvarov 1927 " : B. P. Uvarov, 1927, Notes on Orthoptera from Morocco, *Bull. Soc. Sci. nat. Maroc*, **7** : 199–215.

" Werner 1929 " : F. Werner, 1929, Wissenschaftliche Ergebnisse einer zoologischen Forschungsreise nach Westalgerien und Marokko (II. Teil), *SitzBer. Akad. Wiss. Wien* (Math.-nat.) (I) **138** : 167–188.

" Chopard 1936 " : L. Chopard, 1936, Contribution a l'Étude de la Faune des Orthoptères du Maroc, *Bull. Soc. Sci. nat. Maroc*, **16** : 151–179.

All other references are given in full.

I am greatly indebted to Dr. B. P. Uvarov for much help and advice, for naming the 1934 collection while I was still at the University, and for examining several new species ; also to Dr. Max Beier, of the Vienna Museum, for identifying many of the Mantidae ; and to Dr. L. Chopard, of the Paris Museum, for identifying some of the Gryllidae and for confirmation of those identified by me.

Blattidae.

1. *Periplaneta americana* (L.). Taroudant, vi.1936, 2 ♀♀. Taken inside the Taroudant " Hotel."

2. *Polyphagina algerica* (Br.) var. *occidentalis* (I. Bol.). Taroudant, vi.1936, 4 ♂♂. Taken at light.

Mantidae.

3. *Eremiaphila denticollis* Luc. Between Midelt and Ari Ayachi, viii.1934, 2 ♀♀. This seems to be the only record of this species occurring in Morocco. Giglio-Tos (1927, Mantidae, *Das Tierreich*, **50** : 53) gives its distribution as Algeria, Tunisia. The other specimens in the British Museum, three in number, are all from Tunisia. It is interesting to find this desert form in the

Atlas Mountains at all. My specimens were collected in the semi-desert " meseta " country between Midelt and Ari Ayachi, that is, between the Middle and Great Atlas, but very much nearer to the latter. It will be noted that this species has not been found in any other part of Morocco, and its occurrence north of the Ayachi range suggests that other desert forms may possibly be found in the semi-desert country immediately north of the eastern Great Atlas.

4. *Ameles africana* I. Bol. Marrakesh, Ijoukak, Mouldirt, vi.1936, 2 ♂♂, 2 ♀♀. Giglio-Tos (*loc. cit.* : 160) gives the distribution of this species as Morocco, Sardinia, and Spain. Chopard (1936 : 162) records it from Tinmel (near Ijoukak) and Ouaounzet (Le Cerf and Talbot). The only other specimen in the British Museum is a male from Taddert (Rungs, 1934). 2 *Ameles* nymphs from Tizi N'Test (vi.1936) probably belong to this species.

5. *Ameles maroccana* Uv. Ari Ayachi, 1934, 2 ♀♀. Described by Uvarov (1930, *Bull. Soc. Sci. nat. Maroc*, **10** : 210) from Ifrane, Middle Atlas. Uvarov's type and paratype, both females, in the British Museum, are apparently the only other specimens known. The known range of this species is thus now shown to extend to the eastern Great Atlas as well as the Middle Atlas. Both my specimens are females, so that the male is still unknown.

6. *Oxyothespis maroccana* I. Bol. Taroudant, vi.1936, 1 ♂. Recorded by Bolivar (1914) from Mogador. Not previously in British Museum collection.

7. *Mantis religiosa* L. Tangier, ix.1935, 1 ♂.

8. *Iris oratoria* (L.). Ari Ayachi, viii.1934, 1 ♂, 1 ♀. Recorded by Bolivar (1914) from Mogador, Mellila, and Tangier, and by Uvarov (1930) from Asni (western Great Atlas), this Mediterranean species is thus shown to have a wide range in Morocco.

9. *Rivetina fasciata* (Thunb.). Ari Ayachi, viii.1934, 1 ♂, 1 ♀. Ijoukak, Mouldirt, vi.1936, 7 nymphs. Not previously in the British Museum collection; Giglio-Tos (*loc. cit.*) gives its range as " Mediterranean basin."

10. *Geomantis larvoides* Pant. Sidi Ali, ix.1935, 1 ♀. Recorded by Bolivar (1914) from the western Great Atlas, but not previously from the Middle Atlas.

Gryllotalpidae.

11. *Gryllotalpa* sp., probably *G. africana* Beauv. Oum er R'bia, viii.1934, 1 nymph.

Gryllidae.

12. *Gryllus campestris* (L.). Sidi Ali, viii.1934, 1 ♀. Sidi Ali, vi.1936, 9 ♂♂, 3 ♀♀. Mouldirt, vi.1936, 1 ♀. Most of the Moroccan specimens I have collected agree with the observations of Chopard (1936) in being of large size, with tegmina and wings reaching to the extremity of the abdomen, and the males having very large heads.

13. *Gryllulus domesticus* (L.). Mouldirt, vi.1936, 1 ♂, 1 ♀. Taken outside.

14. *Gryllulus burdigalensis* (Latr.). Taroudant, vi.1936, 2 ♀♀.

15. *Gryllulus algericus* (Sauss.). Ras el Ma, vi.1936, 1 ♀. Not previously in the British Museum collection.

16. *Lissoblemmus* (*Mesoblemmus*) *uvarovi* I. Bol. Sidi Ali, vi.1936, 3 ♂♂.

17. *Lissoblemmus* (s.str.) *azruensis* (I. Bol.). Ras el Ma, vi.1936, 3 ♂♂.

18. *Sciobia finoti* Br. Ourika, vi.1936, 1 ♂. Recorded by Werner (1929) from Azrou, and now shown to extend into the west of Morocco as well as the

east and into the Great Atlas as well as the Middle Atlas. Not previously in British Museum collection.

19. *Sciobia chevreuxi* I. Bol. Azrou, vi.1936, 7 ♂♂, 7 ♀♀. Mostly taken in couples (♂ and ♀ together) under stones.

20. *Sciobia caliendrum* (Fisch.). Azrou, vi.1936, 1 ♂, 1 ♀. In same locality as the previous species.

21. *Gryllomorpha* sp. Ijoukak, vi.1936, 1 ♂.

TETTIGONIIDAE.

22. *Phaneroptera nana* Fieb. Taroudant, vi.1936, 1 ♀. Recorded by Bolivar (1914) from Tangier, this species extends in range from southern Europe to South Africa. I cannot find another record for Morocco; the British Museum has no other specimens from North Africa, and none from Europe.

23. *Odontura maroccana* I. Bol. Amizmiz, vi.1936, 1 ♂, 2 ♀♀. Not previously in British Museum collection.

24. *Odontura* sp. n.? Ras el Ma, vi.1936, 1 ♀. This does not appear to belong to any known species, but as there is only a single female, I prefer to wait until further material has been collected rather than to describe a species from one specimen.

25. *Platycleis grisea grisea* (Fabr.). (= *Metrioptera albopunctata* (Goeze)) Sidi Ali, viii.1934, 2 ♀♀. Timhadit, ix.1935, 1 ♀. Ijoukak, vi.1936, 1 ♀. All these four females, like the one noted by Chopard (1936), belong to the subspecies *grisea* (Fabr.), not to *P. g. occidentalis* Zeuner.

26. *Platycleis affinis* (Fieb.). Ari Ayachi, viii.1934, 1 ♀.

27. *Tettigonia viridissima* L. Ouiouane, viii.1934, 1 ♂, 1 ♀. I cannot find any other record of this species from Morocco, and there are no other specimens from North Africa in the British Museum collection.

28. *Tettigonia lozanoi* (I. Bol.). Sidi Ali, vii.1934, 1 ♂, 1 ♀. Described by I. Bolivar (1914), without, however, the locality of the type being specified. Presumably it was Mellila, as this was where Lozano made his main collection. Chopard (1936) records it from Tadla and Tazarine, and two other specimens, also from the Middle Atlas (Rungs, Ifrane, 1935), are in the British Museum collection.

29. *Eugaster spinulosus* (Joh.). Azrou, vi.1936, 1 nymph.

30. *Eugaster guyoni* Serv. Timhadit, viii.1934, 3 ♂♂, 3 ♀♀. Ras el Ma, vi.1936, 1 nymph. Sidi Ali, vi.1936, 1 nymph. Buxton (1923, *Animal Life in Deserts*) gave this species as an example of a desert-dwelling animal with apparently inexplicable black coloration. In Morocco, however, I have never seen it very far away from water. At Sidi Ali there is, of course, the lake (Aguelman), while at Timhadit I observed it usually not far away from the lush vegetation by the river Guigou. The single specimen from Ras el Ma was found very near to the forester's house, and in a part of the Middle Atlas cedar-forest country where the forest is more than usually mixed with deciduous trees and has a very thick undergrowth. Consequently the air here is much moister than in most parts of Morocco; in such areas as the dry " meseta " between Midelt and Ari Ayachi I never saw *E. guyoni* at all, although it is a conspicuous insect which one is not likely to miss. Unlike many desert TENEBRIONIDAE, the black Eugasters are not provided with an air chamber, which would offset, so to speak, to some extent the disadvantages of their blackness when exposed to strong sun.

31. *Eugaster nigripes* Chop. Ijoukak, vi.1936, 1 nymph. Mouldirt,

vi.1936, 3 nymphs. The remarks about the preceding species probably apply to *E. nigripes* as well. This species was described by Chopard (1936) from two specimens found by Dr. Hemilsdan at Ifegh.

32. *Uromenus chapmani* Uvarov, sp. n. Sidi Ali, viii.1934, 6 ♂♂, 9 ♀♀. Sidi Ali, ix.1935, 2 ♀♀. Sidi Ali, vi.1936, 1 ♀ nymph.

In July and August, 1934, this species was by far the commonest of the larger insects at Sidi Ali. It is rather remarkable, therefore, that no specimens have been found anywhere else in the Middle Atlas during the last three years. In 1934, *U. chapmani* was so common at Sidi Ali that it was impossible to prevent numerous individuals from getting into my kit and travelling to my next camp at Timhadit, about 14 miles away. Many of them dislodged themselves here, but apart from these specimens which had travelled thus from Sidi Ali not a single *U. chapmani* was to be found.

Uromenus chapmani sp. n. (fig. 1).

Description by Dr. B. P. Uvarov.

♂. Under medium size, uniformly coloured (specimens from alcohol); head with blackish pattern behind. Fastigium of vertex thick, moderately compressed, sulcate above, projecting forward. Pronotum with deep folds and thick rugosities in the prozona. Metazona a little shorter than the prozona, shiny, with very low, thick and indistinct rugosities and scattered small punctures; median carina scarcely raised; posterior margin incrassate, very shallowly excised. Lateral lobes inserted under an obtuse angle broadly rounded behind. Elytra with the disc and the marginal cells black. Front femur unarmed; front tibia with two spines on the upper margin, apart from the apical one. Hind femur only about twice as long as pronotum, armed with 5–6 spinules in the apical third of the inner margin. Anal segment transverse, rounded. Supra-anal plate not separated from the anal segment, broadly lanceolate. Cercus stout, longer than the supra-anal plate, with an acute spine beyond the middle of the inner side; the apex acutely conical pointing outwards. Titillator long, straight, with the acute apex bent outwards under an obtuse angle. Subgenital plate large, rounded, with a narrow and shallow apical emargination between the short styli.

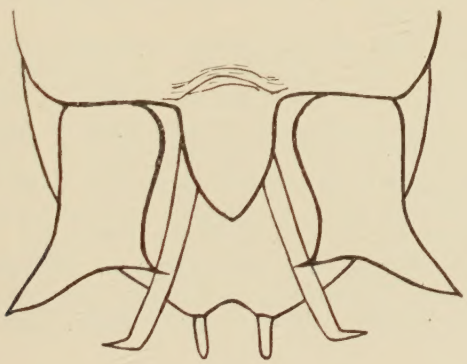

Fig. 1.

♀. Abdominal tergites 3–5 blackened, with a median pale stripe and comma-shaped, sublateral, pale spots. Subgenital plate transverse, with the disc flat and strongly transversely rugose; posterior margin broadly excised; lateral surfaces perpendicular, smooth,

each with a shallow vertical pocket in front of the swollen posterior margin. Ovipositor slightly recurved, somewhat longer than the hind femur.

Total length ♂ 21, ♀ 24; pronotum ♂ 6, ♀ 6·5; front femur ♂ 6, ♀ 7; hind femur ♂ 12·5, ♀ 14; ovipositor ♀ 17·5 mm.

Described from 6 males and 9 females taken at Aguelman Sidi Ali ou Mohammed, 6500 ft., Middle Atlas.

Allied to *U. bueni* I. Bolivar, but differs from it in its much smaller size, relatively shorter legs (hind femur only twice as long as pronotum) and relatively longer ovipositor. The male subgenital plate in *U. bueni* is described as having a deep triangular emargination, which is not the case in the present species. There may be other details in the shape of different parts of genitalia, but they cannot be deduced from the brief description of *U. bueni*. A subspecies of *U. bueni*, called *U. bueni parvus* I. Bolivar, although smaller than the typical form, is larger than *U. chapmani* and has definitely much longer legs (hind femur three times as long as pronotum). Another closely allied species is *U. theryi* Werner, recently described from the Middle Atlas (1934, *Bull. Soc. Sci. nat. Maroc*, **14** : 51). It differs from *U. chapmani* by the broader supra-anal plate, less deeply emarginate subgenital plate and by the cerci being longer and armed with a strongly curved spine (B. P. U.).

The stridulation in *U. chapmani* is very loud, and appears to be almost as powerful in the female as in the male. The noise continues throughout the day and night, and continues for a long time after the removal of the head and abdomen of the insect.

At Sidi Ali, vast numbers of apparently starving *Uromenus* invaded our tents and devoured cloth, wool, and other such unpromising material. Outside, they appeared to be feeding on any kind of vegetation, and on other insects, frequently on the Moroccan locust, *Dociostaurus maroccanus* (Thunb.), on one another, and on several common species of Tenebrionid beetles of such genera as *Pimelia* and *Blaps*, which were the only terrestrial insects approaching *U. chapmani* in numbers at Sidi Ali. These " desert beetles," in their turn, are often cannibalistic, and prey on the *Uromenus*; individuals of *U. chapmani* were frequently observed devouring one another's legs or pursuing females and eating their ovipositors.

Large numbers of birds of many species were seen preying on Orthoptera at Sidi Ali. I think it very probable that the seasonal abundance of such species as *U. chapmani* must affect the movements of birds like the kestrel very considerably, judging from the unusual sight of crowds of these birds together devouring the Tettigoniids at Sidi Ali. Mr. P. T. Cotton and I examined the stomach contents of birds shot at Sidi Ali in July, 1934, and in the following eight species quite 90 per cent. of stomach content consisted of *Uromenus chapmani*: *Pica pica mauretanica* Malherbe (Moroccan magpie); *Garrulus glandarius* L. (jay); *Pyrrhocorax pyrrhocorax* L. (chough); *P. graculus* L. (Alpine chough); *Corvus monedula* L. (jackdaw); *Coracias garrulus* L. (roller); *Falco tinnunculus* L. (kestrel); *Milvus migrans* Bodd. (black kite).